

**TITLE: Torque convertibl adapt r f r driving tools**

BACKGROUND OF THE INVENTION

The present invention relates to household tools and more particularly to a torque convertible adapter for driving  
5 tools.

As we know that a screwdriver and/or a socket spanner are indispensable for a family, a factory or a skilled worker. Generally, a screwdriver or a socket spanner is fixed to a handle. But some of them have a ratchet disposed therein in  
10 order to facilitate rotation to provide more convenient to the users.

Conventional torque screwdriver and/or a torque socket spanner include a spring to create elasticity to intensify their torque. But the torque could not be adjusted.  
15 Furthermore, the producer of the tools still follows the ratchet type to improve the driving tools. Therefore, no any evolution.

SUMMARY OF THE PRESENT INVENTION

The present invention has a main object to provide a torque  
20 convertible adapter which has a multi-stage automatically torque convertible structure that gradually intensifies its torque so as adaptable to a screwdriver or a socket spanner.

Another object of the present invention is to provide a torque convertible adapter for driving tools which has a swivel  
25 cap for adjusting the torque of the socket spanner and provide

a simple and convenient structure to assemble and to operate.

Accordingly, the torque convertible adapter for driving tools of the present invention comprises generally a tubular body connected to a handle through a rectangular extension including a threaded outer periphery and a plurality of circular recesses in different depth spacedly formed around the bottom for respectively disposing a plurality of springs in different intensity of torques, a steel ball disposed at the outer end of each of the springs and respectively engaged within a plurality of semi-circular recesses in the bottom of the enlarged circular end of a socket spanner which is inserted into tubular body and secured by a screw through the screw holes in the center of the enlarged circular end and bottom of the tubular body, a ring pad sleeved onto the socket spanner and a U-shaped cap which has threads on inner periphery engaged with the threaded outer periphery of the tubular body and a central bore for permitting the socket spanner passing through to protrude outside of the adapter.

When uses the adapter to fasten a hexagon headed screw, the spring provides different intensity of torques to obtain the torque convertible purposes.

The present invention will become more fully understood by reference to the following detailed description thereof when read in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded perspective view to show a torque convertible adapter of a preferred embodiment of the present invention,

Figure 2 is a perspective view to show the assembly of Fig. 1,

Figure 3 is a sectional view to show the inner arrangement of the adapter of the present invention,

Figure 4 is a sectional view taken along line 3-3 of Fig. 3,

Figure 5 is a sectional view indicating that the enlarged circular end of the socket spanner slides out of the first and second springs and stops against the third springs,

Figure 6 is an exploded perspective view to show an alternate embodiment of the adapter of the present invention,

Figure 7 is a perspective view to show the assembly of Fig. 6,

Figure 8 is a sectional view to show the inner arrangement of the adapter of the present invention,

Figure 9 is a longitudinal section of Fig. 6, and

Figure 10 is a longitudinal section indicating that the is fastened inward to intensify the torque of the adapter.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A typical embodiment of the disclosure of the present invention is illustrated in Figs. 1, 2 and 3, the torque convertible adapter 10 for driving tools comprises a tubular

body 13 which has a rectangular extension 131 on rear end connected to a handle 11, a threaded outer periphery 132, a circular receiving space 133 in front end, in the bottom of which is three pairs of circular recesses 101, 102 and 103 in different depth and each pair of the circular recesses are positioned symmetrical with each other. For example, the first pair of the circular recesses 101 are shallow, the second pair of the circular recesses 102 are deeper than that of the first pair 101 and the third pair of circular recesses 103 are deeper than that of the second pair 102, a screw hole 134 in the central bottom of the tubular body 13, three pair of springs 104, 105 and 106 in different elastic intensity and different length respectively engaged into the three pairs of recesses 101, 102 and 103 each having a steel ball 107 at their outer ends, a socket spanner 12 having an enlarged circular end 121 inserted into the circular receiving space 133 having six semi-circular recesses 122 and a through hole 123 at center respectively engaged with the steel balls 107 and the screw hole 134 of the tubular body 13, a screw 15 rotatably fastens the socket spanner 12 on the bottom of the tubular body 13 through the hole 123 and the screw hole 134, a ring pad 16 sleeved onto the outer periphery of the socket spanner 12 and a U-shaped cap 14 having threads 141 on inner periphery engaged with the threads on outer periphery of the tubular body 13 (as shown in Fig. 4) and a central ball 142 for permitting the

socket spanner 12 passing through and protruding out of the adapter 10.

In operation, rotate the handle 11 actuating the socket spanner 12 to fasten a working piece such as a hexagonal screw, suppose the torque value required to fasten the screw is A, the steel ball 17 under the elasticity of the first pair of springs 104 create a torque value is  $A' > A$ . The socket spanner 12 is stable and rotated together with the tubular body 13 and handle 11. If the torque value required is larger than  $A'$  that the pair of first springs 104 could not bear torque, then the second pair of springs 105 are functioned in cooperation with the first pair of springs 104 that a greater elasticity will be created to finished job.

If a working piece requires a greatest torque value, the enlarged circular end 121 of the socket spanner will slide out the steel balls on the first and second pairs of springs 104 and 105, and moves deeper into the circular receiving space 133, the third pair of springs 106 begin to act together with the first and second pairs of springs 104 and 105 to provide greatest elasticity to fasten the working piece (as shown in Fig. 5).

Based the above discussed structure and function, the circular recesses 101, 102 and 103 may be increased more the three pairs to intensify the torque value and the socket spanner 12 may be replaced with a shank of a screwdriver or

an allen wrench.

Referring to Figs. 6 to 9 of the drawings, an alternate embodiment of the torque convertible adapter of the present invention is provided. This adapter 20 comprises a tubular body 23 having a rectangular extension 231 on rear end for connected the tubular body 23 to a handle 21. The tubular body 23 has threads on outer periphery, a circular receiving space 233 in front end and a plurality of first semi-circular recesses 234 spacedly formed around the inner bottom for respectively disposing a plurality of steel balls 235 therein. A socket spanner 22 has an enlarged circular rear end inserted into the circular receiving space 233 of the tubular body including a plurality of second semi-circular recesses 221 in outer bottom engaged with the outer portion of the steel balls 235, and a hexagonal opening in front end, a spring 25 sleeved onto the outer periphery of the socket spanner 22. A U-shaped cap 24 fastens to the outer periphery of the tubular body 23 has a threaded inner periphery 242 engaged with threads 232, an annular shoulder 241 formed on a inner periphery for stopping against the front end of the spring 25 and a central bore 243 in front end for permitting the socket spanner passing through and protruding out of the adapter 20.

When fastens a working piece, the socket spanner 22 has to bear a certain torque value. If the second semi-circular recesses 221 of the enlarged circular end 222 under the

pressure of the spring 25 not slide out of the steel balls,  
it proves that the torque value of the socket spanner 22 is  
greater than torque value it bears. If the socket spanner  
bears the torque value greater than that it has, the second  
5 semi-circular recesses 221 will slide out of the steel balls  
235. So that the socket spanner 22 is in the state of idling.

Meanwhile, the operator may gradually rotate the cap 24  
clockwise to intensify the elasticity of the spring 25 to press  
the enlarged circular end 222 moving inward in order to prevent  
10 the second semi-circular recesses 221 from sliding out the  
steel balls 235. This non-step torque value adjustment  
provides greater convenience for the user to operate and  
assemble the adapter 20.

Fig. 10 show that the cap 24 is moved to an inmost position  
15 and contacted the rim of the tubular body.

Note that the specification relating to the above  
embodiment should be construed as exemplary rather than as  
limitative of the present invention, with many variations and  
modifications being readily attainable by a person of average  
20 skill in the art without departing from the spirit or scope  
thereof as defined by the appended claims and their legal  
equivalents.